REMARKS

Claims 1, 2 and 4-13 are in this application. Claim 2 is canceled by this amendment. Reconsideration of the outstanding Final Office Action and allowance of this application is respectfully requested.

EXAMINER INTERVIEW

Applicant wishes to thank Examiner Alexander for the courtesies that were extended to Stephen R. Seccombe during a telephone interview on January 18, 2005, in which Mr. Seccombe agreed to cancel claim 2, and the Examiner suggested filing of this Request for Reconsideration. Mr. Seccombe suggested the Ezoe et al. reference as that most relevant, in that it discloses two operating modes of the monitoring device being selectable by switch 190, one being normal closed-loop engine operation - contact 194, the other being open-loop measurement of the internal resistance of the O_2 sensor - contact 192. Mr. Seccombe explained that even this closest reference fails to disclose Applicant's claimed invention which requires a simulated O_2 sensor mode (claim 1) in which *simulated* O_2 sensor signals are delivered to the vehicle computer, while monitoring the sensor for its reaction to the simulation. Mr. Seccombe also explained a similar distinction regarding claim 4, which requires an O_2 sensor input for receiving the sensor signal (the sensor being disconnected from the on-board computer), and a simulate output (which is connected to the on-board computer in place of the sensor), the analyzer having a closed-loop mode in which the simulate output follows the sensor signal, and a simulate mode in which the simulate output is driven in an arbitrary manner in isolation from the sensor signal to produce lean and/or rich engine operation, there being a display for indicating the sensor signal.

REJECTIONS UNDER 35 U.S.C. 102(b) and 103

In the final Office Action, claims 4-13 were rejected under 35 U.S.C. 102(b) as being anticipated by each of the Anderson, Bienkowski, Luchaco and Ezoe et al. references; and claim 1 and the now canceled claim 2 were rejected under 35 U.S.C. 103 as being unpatentable over Anderson, Bienkowski, Luchaco and Ezoe et al. alone or in view of the Zeleski reference. These rejections are respectfully traversed as to the remaining claims 1 and 4-13.

The Applied References

The Anderson reference discloses an automotive emission control system having a universal exhaust gas oxygen sensor located between series-connected upstream filter and downstream main exhaust catalysts, and a control system responsive to the sensor for adjusting the engine air/fuel ratio. Compensation for chemical aging of the upstream catalyst is obtained by adjusting an initial control loop gain based on empirically established rates of degradation of the upstream catalyst and the sensor, the loss in sensor gain with aging offsetting the effect of increased passage of noxious gaseous effects through the upstream catalyst. Applicant emphasizes that once the sensor of an operational system is installed and connected in the closed-loop system, *no testing of the sensor is disclosed.* Also, there is no description of "empirically determining the degradation rate of said sensor with normal usage reduces the gain of the sensor" (quoted from claim 26).

The Bienkowski reference discloses an oxygen sensor monitor having a plug power connection to a vehicle cigarette lighter socket and a lead for connection to the output of the installed oxygen sensor. The sensor output is buffered and compared with a 0.45 volt reference, an indicator light being responsive to the comparison. Normal closed-loop

operation is evidenced by flashing of the indicator light at a low repetition rate (1-4 Hz). Applicant emphasizes that the indication is only whether the signal is above 0.45 volts (richer than stoichiometric) which gives virtually no information on sensor operation, e.g. how rich or lean, range of operation, or reaction speed.

The Luchaco reference discloses a fuel injection system including a failure detection system for the exhaust gas sensor. The failure detection system includes a control circuit that enables failure detection when engine operating parameters such as temperature, fuel flow, RPM, and throttle setting are indicative of the engine being hot and idling for a sufficient period relative to thermal time constants. When enabled by the control circuit, a transition interval indicator determines whether sensor transitions are rapid (normal) or slow (abnormal), the abnormal condition being latched and suitably indicated to the operator. The output of the transition interval indicator also modifies the timing of a subset of fuel injectors to effect a periodically lean mixture. Applicant emphasizes that the failure detection system is effective for detecting essentially catastrophic failures under operation near stoichiometric (450mV), not over a full range of operation which is typically from below 175mV to above 800mV.

The Ezoe et al. reference discloses a diagnostic monitoring device that measures the frequency of the feedback control signal of an engine air/fuel ratio control system to estimate the state of the gas sensor. In one embodiment, indicator lamps show whether the frequency is above or below a predetermined level; in another, whether the frequency is within a predetermined range is indicated. Applicant emphasizes that the monitoring device is operative only under specific operating conditions of the engine to produce an appropriate operating temperature of the sensor (such as $1900 < RPM < 2100$ for one minute, and the engine being at operating temperature). The failure detection system is effective for detecting essentially catastrophic failures under operation near stoichiometric (450mV). Also disclosed is a tester for verifying that the internal resistance of the sensor (when disconnected from the control system) is within a predetermined range, such as between 100 k ohms and 500 k ohms.

The Zeleski reference discloses a microprocessor based tester that interacts with the computer data bus to exercise various electronic subsystems and monitor responses thereto. A keyboard is provided for overriding pre-programmed diagnostics.

Argument

The rejection of claims 4-13 under 35 U.S.C. 102(b) is believed to be inappropriate at least for the reasons that none of the applied references, nor any of the other references, discloses the combination of an electronic circuit for receiving an oxygen sensor signal and having a simulate output for connection to a vehicle on-board computer in place of the oxygen sensor signal, with logic for driving the simulate output in (a) a closed loop mode, the simulate output directly following the oxygen sensor signal, and (b) a simulate mode, the simulate output being driven arbitrarily in isolation from the oxygen sensor signal for forcing the engine to run one or both of lean and rich, and a display for indicating the oxygen sensor signal (claims 4 and 12). It is believed that the distinctiveness of this combination was properly explained in the above-described Examiner Interview.

The rejection of claim 1 35 U.S.C. § 103 is also believed to be inappropriate because claim 1 requires a simulated oxygen sensor mode that corresponds to the combination described in the preceding paragraph. Moreover, claim 1 requires the claimed analyzer to have a closed loop mode showing dynamic operation of the oxygen sensor, a simulated mode in which the sensor is monitored with simulated sensor signals being fed to the vehicle computer, and a test mode in which the /engine is forced to run lean without propane injection. None of the references, alone or in combination, either disclose or suggest such a combination, having both a closed loop mode of operation, and an open loop mode with simulated oxygen sensor signals input to the vehicle computer.

Accordingly, it is believed that the rejections of claims 4-13 under 35 U.S.C. § 102(b) and the rejection of claim 1 under 35 U.S.C. § 103 are in error and should be withdrawn.

In view of the above, it is believed that this application, including each of the claims 1 and 4-13, is in condition for allowance. Such allowance is respectfully requested. If for some reason the Examiner considers otherwise, it is respectfully requested that a telephone call be placed to the undersigned so that issuance of a patent can be expedited.

Respectfully submitted,

SHELDON & MAK

Date: February 25, 2005 By

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I hereby certify that this correspondence is being deposited with the U.S. Postal Service as First Class Mail in an envelope addressed to: BOX RESPONSE, Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia, 22313-1450, on February 25, 2005.

Signed: February 25, 2005 By:

Jennifer Akai
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